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April 20, 2007

MEMO TO: Craig DeShane  
FROM: Bob DeShane  
RE: FOLLOW UP TO "The Camshaft Chronicles"

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Craig, this is further to our conversation of this morning where you requested some information related to my article submitted to the British Saloon Car Club – OILY RAG, January/07. As you know, my curiosity was peaked by our own experiences at the shop and within our racing group at VARAC, which you have been a part of.

The article was initially written simply to warn our customers and friends about the dangers of running newer oil formulations in our old cars. However, as time goes on, this topic becomes more interesting all the time. I have had many comments and queries from all across the country and the US about the article. It has been published in several car club newsletters.

More recent research that I have conducted on the topic shows that more folks are becoming aware of the problem. I have also learned how the zinc (ZDDP) acts inside the engine to form a sacrificial wear coating that protects the metals.

Attached, you will find for your reference the following:

- The Camshaft Chronicles (Bob DeShane, Little Britain Motor Company)
- ZDDP (Keith Ansell, Foreign Parts Positively, Inc.)
- Oil is Killing Our Cars Part II (Keith Ansell, Foreign Parts Positively, Inc.)
- Product Data Sheets for Valvoline Oils (The Valvoline Company)
- Flat Tappet Cam Tech (Hot Rod Magazine Website)
- Current Opportunity (TechroBond Website)

*Little Britain Motor Company*

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## Key Points Learned

- “Even stock passenger cars can see pressure in excess of 200,000psi at the point between the lifter crown and the cam lobe contact” (Hot Rod article). This makes me wonder what sort of pressures exist in racing applications where high-lift profiles and heavy valve springs are used.
- “ZDDP ( Zinc dialkyl dithiophosphate) when heated in the high temperatures of the engine, decomposes to form an extremely thin layer of phosphorous glass over the engine surfaces which is referred to as “glassification”. The new layer of glass is perpetually worn away and replenished, protecting the metal surfaces from wearing away.
- Only 12% of the useful energy is used in current engines with about 10% of energy lost in friction. In what may seem a counterintuitive idea, the frictional losses in the engines arise partly due to the use of ZDDP as an anti-wear additive that protects the engine but also results in higher friction.
- Flat tappet engines, being older technologies require the superior wear protection provided by oils having adequate concentrations of ZDDP (at least 0.11 wt%).
- Newer technology engines employing a roller to camlobe interface are capable of operating on safely on lower concentrations of ZDDP (0.08 wt%) as provided by new energy conserving motor oils)
- ZDDP reduction in motor oil has been driven by more stringent emissions legislation. ZDDP has an adverse affect on catalytic converter efficiency.
- Environmental legislation will advance in the coming years and it will require auto manufacturers to both further reduce exhaust emissions and increase fuel efficiency. It would seem reasonable to assume that ZDDP could be further reduced or replaced in motor oils as greater engine efficiencies are sought and new engineering solutions come on stream.

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